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MCZ newsletter
MUSEUM OF COMPARATIVE ZOOLOGY

INTRODUCING THE NEW MCZ LABORATORIES — FROM TOP TO BOTTOM

The new wing is coming to life. Three floors and the basement are already occupied and completion of the fourth floor is beginning. Plans are being designed for the finishing of the third floor by the end of next year at which point the building will be fully operational.

Curatorial assistant Suzanne Van Loon at work with the spiders. She is presently recovering from the mammoth task of supervising the move of the entire non-insect invertebrate collections from their former locations in the "old" MCZ. The operation took four staff members five months to complete.

Diane Randolph of the Arachnology Department in spacious new surroundings.

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The fifth floor is the new home of the MCZ's vast collections of spiders, centipedes, millipedes, crustaceans, worms, and jellyfish. The corals will be moved in within the next year. There are over 500,000 specimens of spiders alone, including 3,000 types, i.e., the actual specimen for which the species was originally named. The collections are actively used with an average of three loans a week going out and coming in. Dr. Herbert W. Levi, Alexander Agassiz Professor and Curator of Arachnology, is now able to accommodate visitors luxuriously; work counters surround the entire collection area and the weary worker is rewarded by a panoramic view of the Cambridge scenery when he looks up from the microscope.

Dr. Levi's office, quarters for his staff and two graduate students, a conference room, and space for a new assistant professor/assistant curator of invertebrates complete this floor.

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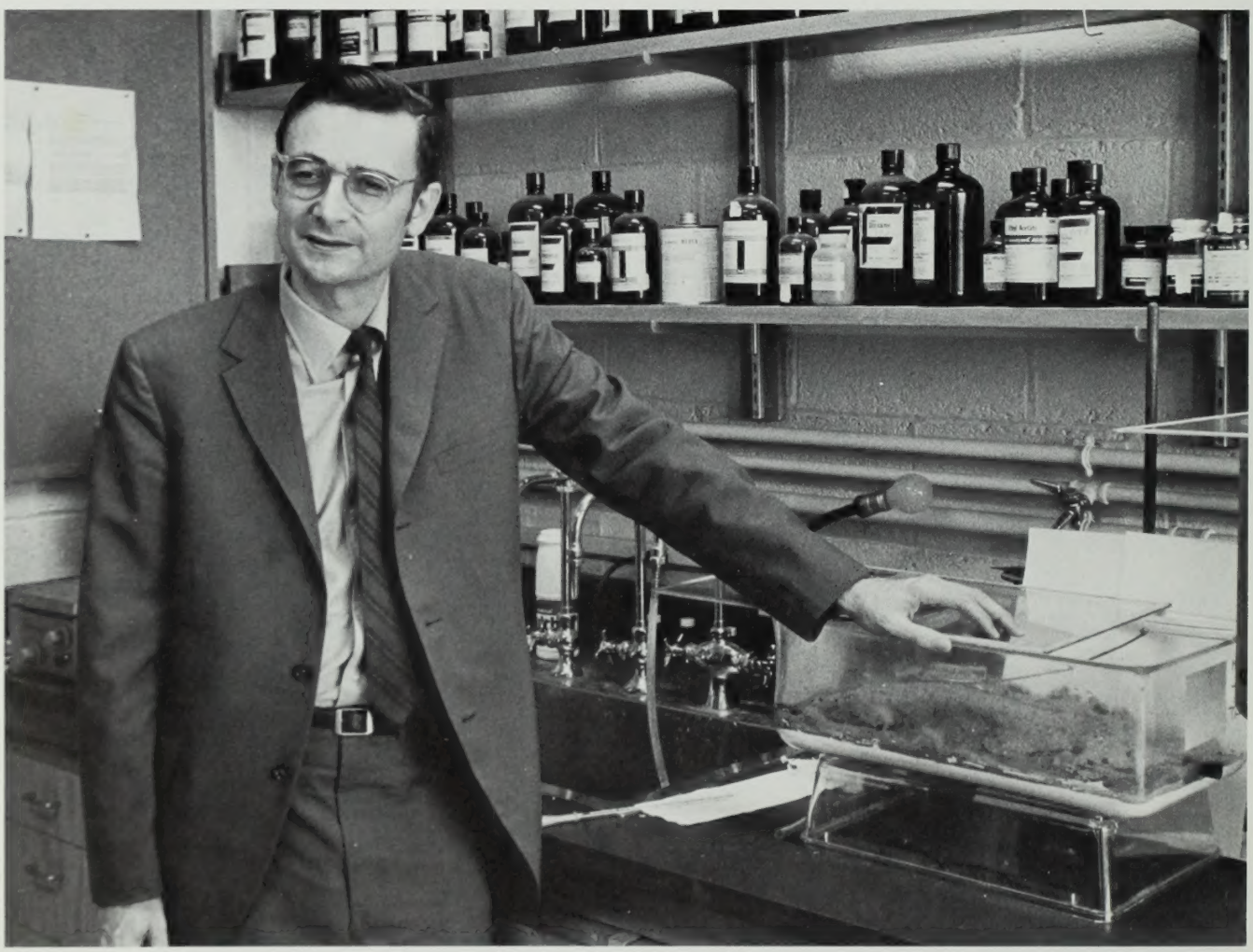
By the beginning of the new academic year, Professors Edward O. Wilson and Bert K. Hölldobler will be comfortably settled on the fourth floor. Their laboratory facilities will include a complete insectary, two controlled temperature rooms (one simulating desert, the other, tropical conditions), a chemistry laboratory, a specially-designed area to analyze high speed film, and the floor will also house a library, staff, and graduate students. A short bridge connects this experimental area to the MCZ's insect collections on the fourth floor of the "old" building. This ease of communication will allow the symbiotic relationship between the experimentalists and the taxonomists to flourish. Of course, these categories are not restrictive; Dr. Wilson has long been interested in the classification of ants, for instance, and lepidopterist Dr. John M. Burns, to cite one of many possible examples, has been using electrophoretic techniques to analyze levels of genetic variation in natural populations as well as to aid in making taxonomic decisions. With the essential resource of the extensive and well-organized collections in the one building and the experimental facilities and expertise in the other, the combined fourth floors should prove to be a fertile area for the growth of many branches of inquiry.

Professor Edward O. Wilson is certainly no newcomer to the MCZ. He has been an Associate in Entomology since 1958 and has been at Harvard since he was a graduate student in 1951 and Junior Fellow in 1953. He was appointed Professor of Zoology in 1964 and as of July 1, will be a Curator in Entomology. Departing briefly from pheromone research, Dr. Wilson's current efforts are being devoted to three projects: 1) the development of a technique for determining the age of ants taken directly from wild nests and engaged in various behavioral acts, so as to make possible for the first time a "socio-demography" of social insects; 2) the writing of a treatise on sociobiology, which synthesizes our knowledge of both invertebrate and vertebrate social behavior with the rapidly maturing science of population biology; and 3) the processing and study of the newly discovered Eocene ant fauna of Arkansas, which should provide the first clear picture of the evolutionary development of these insects between the mid-Cretaceous (about 100 million years ago) and the Oligocene (about 35 million years ago). Rapid progress is being made in all three areas. Dr. Wilson expects that "by 1975 the treatise will be completed and possibly even published, while substantial results in socio-demography and Eocene ant evolution should be in hand." Professor Wilson teaches Biology 1, the

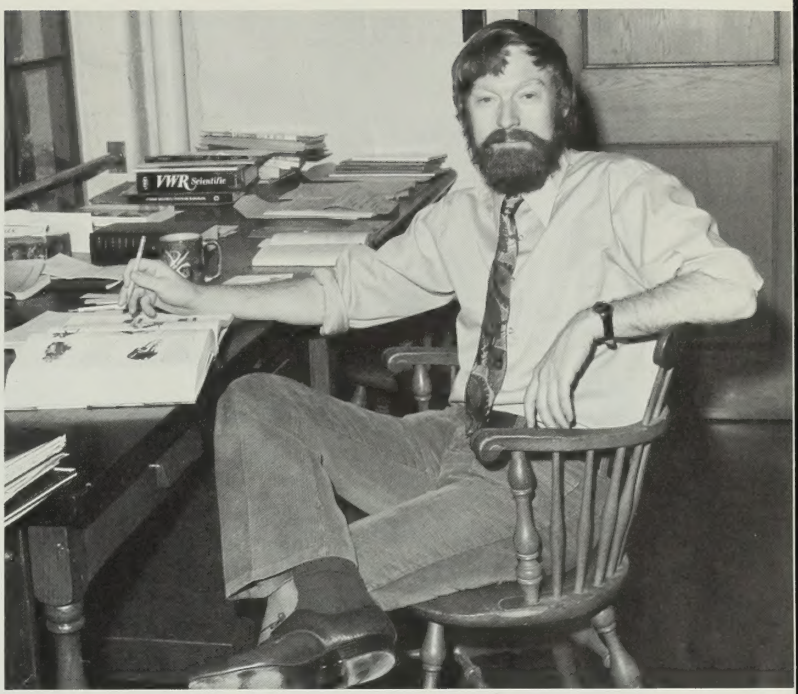


Professor Wilson in his laboratory in the Biological Laboratories. He will shortly be moving his lab to the MCZ Laboratories. (Photo by Selina Roberts)

introductory course for Organismic and Evolutionary Biology and Biology 244 with Professor Irven DeVore on Sociobiology in which discussion centers on the question: Is a general science of sociobiology feasible at this time?

Professor Bert K. Hölldobler has recently been appointed as Professor of Biology in the area of Invertebrate Behavior. Whereas Professor Wilson is more interested in how insects function in a society, Professor Hölldobler is more concerned with their behavior in relation to their environment and the methods they use to orient themselves towards food, home, and each other. In close collaboration with natural product chemists and receptor physiologists, Dr. Hölldobler uses gas chromatography to separate the different chemical compounds that are used in communication; he employs histological techniques to analyze glands and sensory receptors; and with radioactive tracers he is able to mark food and follow its course in the social exchange pattern.

Dr. Hölldobler comes to Harvard from the University of Frankfurt; he was here before as a Research Associate working with Dr. Wilson from 1969 to 1971. A student of Martin Lindauer, he received his doctorate degree from the University of Würzburg in 1965. He will teach two courses: an introductory one on animal behavior in general, and an advanced one concentrating on invertebrate behavior in particular.



Professor Hölldobler at his present desk in the Biological Laboratories.

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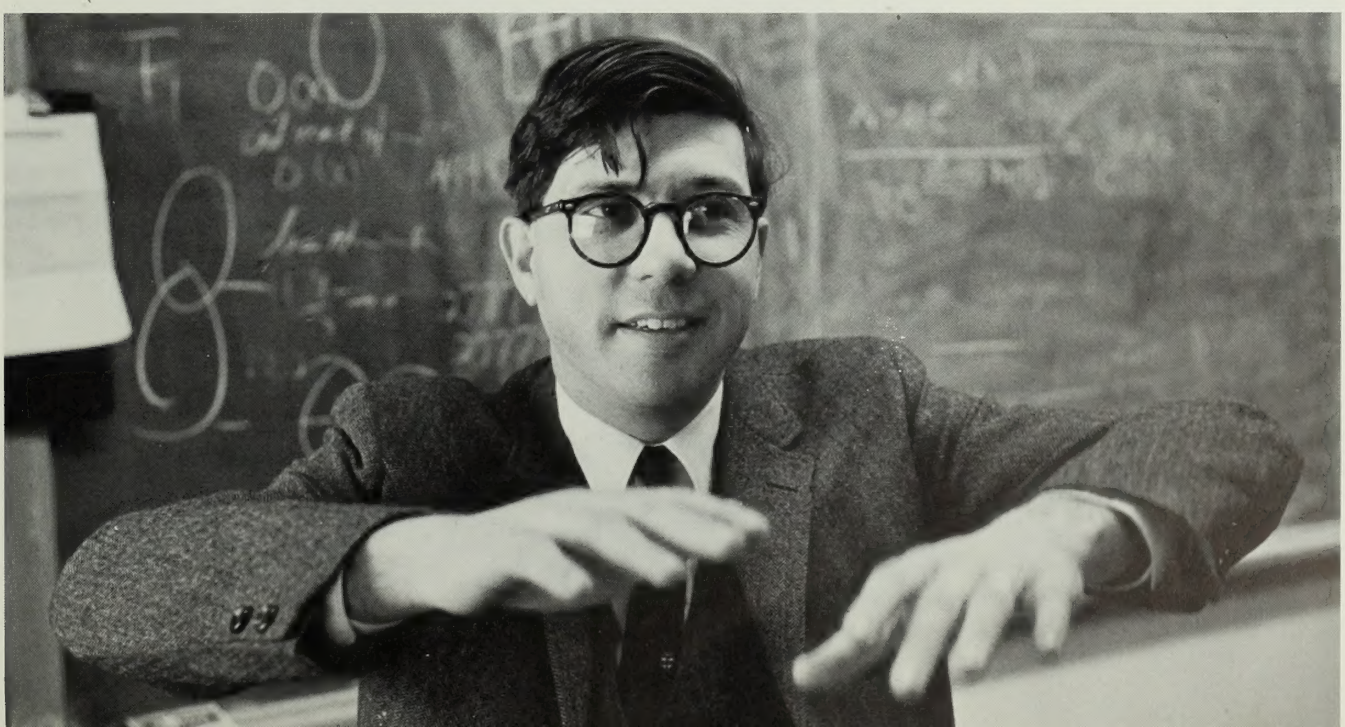
3 When Professor Richard C. Lewontin joins the staff on July 1, he will fill a long-felt need for a population geneticist in the overall teaching and research program in biology here at Harvard. Professor Lewontin, who is both an outstanding theoretician and an ingenious experimental researcher, has made several pioneering contributions by relating theoretical population biology to genetic variation in natural populations. He will teach an undergraduate course as well as continue his population studies. His research will complement the work of Harvard's ecologists, evolutionists, and systematists and his presence is expected to have a stimulating effect on the entire Department of Biology.

Dr. Lewontin received his Ph.D. from Columbia University in 1954 and is currently Professor of Zoology at the University of Chicago. Dr. Lewontin and his students will occupy the third floor of the MCZ Laboratories and it is hoped that this will be completed within the next year. The floor will contain a complete electrophoretic laboratory and controlled temperature rooms as well as office and lab space for Dr. Lewontin and his students.



Daphne Slocombe, Animal Care Technician, divides her attention between some of her assorted charges but Simon, the spider monkey, appears to be experiencing some form of sibling rivalry.

The conference room – a peaceful spot on a busy floor.

2 The second floor is already a bustling center of activity. Director A.W. Crompton and Associate Professor Farish A. Jenkins, Jr. are settled into their laboratories and the x-ray equipment with which they study functional anatomy is being transferred from the basement of the MCZ. With the aid of cineradiography and high speed photography, Dr. Jenkins is able to analyze locomotion while Dr. Crompton concentrates on mastication. By relating their findings in living animals to the structures of fossil animals, these paleontologists are able to understand how extinct forms functioned. A complete operating room will also start to see use this summer; Dr. Karen Hiiemäe of Guys Hospital, London, hopes, with the aid of electromyographic techniques, to determine what muscles the American opossum uses while chewing its food.

The two animal rooms have a lively and varied population including, among other creatures, Jeremy, the leisurely slow loris, nine Madagascan tenrecs, galagos, two white rabbits, and two spider monkeys who commute to and from the Concord Field Station where the animals enjoy the country air when their presence is not essential to research in Cambridge. Four graduate students have their offices and labs on this floor and there is also an office for visitors occupied this month by vertebrate paleontologist Dr. F.R. Parrington, F.R.S., from Cambridge, England.

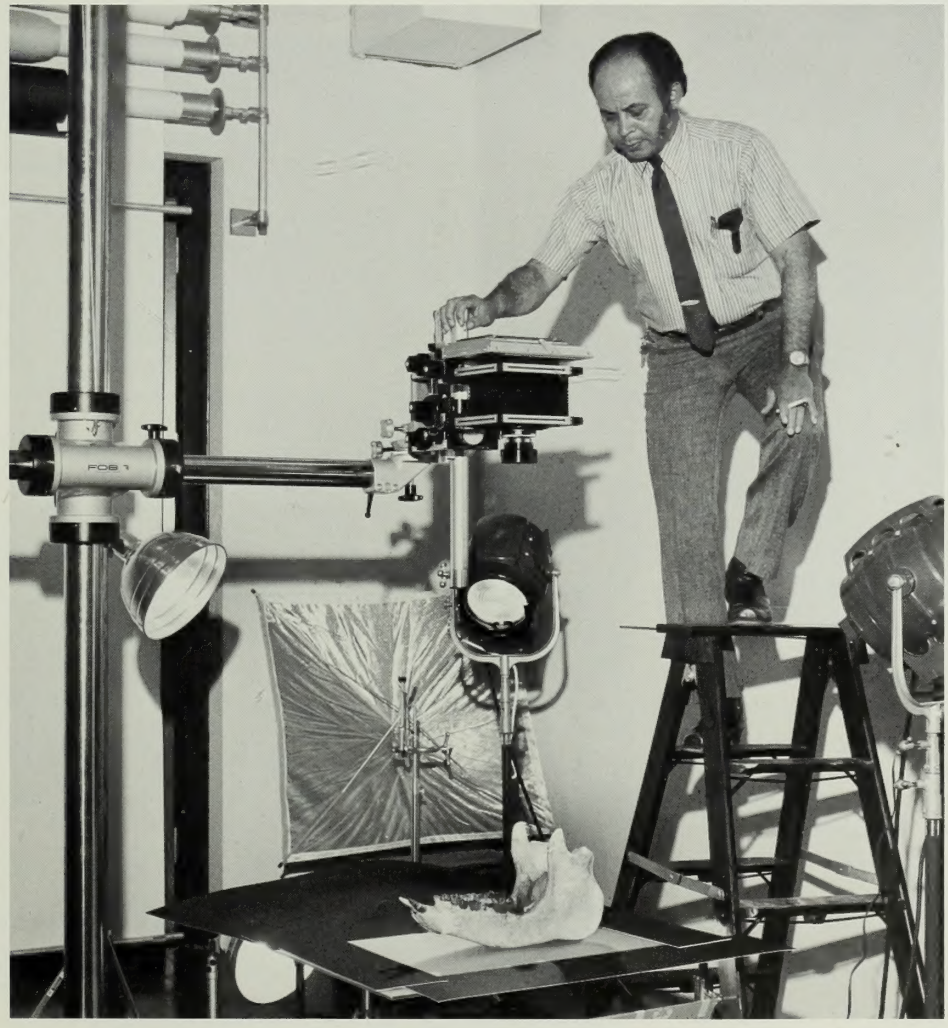
Ken Rose, a graduate student studying paleontology, with some of the tools of his trade. He is one of four students presently working on this floor.

When the laboratory areas of the first floor are completed, Dr. Karel F. Liem, Henry Bryant Bigelow Professor of Ichthyology and Curator of Fishes, will be able to keep live cichlid fishes from Lake Tanganyika and Lake Nyasa for his studies on the functional anatomy and evolution of their feeding and respiratory mechanisms. By recording the electric signal that is emitted every time a muscle contracts with an electromyographic unit and analyzing the simultaneous mechanical movements with the aid of high speed motion photographic equipment, Dr. Liem is able to synchronize the electrical and mechanical events in his research into their relationship.

Dr. Tyson R. Roberts, Assistant Curator/Assistant Professor, will continue his studies on the comparative osteology of characoid fishes upon his return from collecting in Ghana. Graduate student Dr. James Wallace will start his inquiry into the evolution and functional anatomy of flat fishes with the aid of the cineradiographic equipment on the second floor. His aquaria will contain marine fishes from the Gulf of Maine. Associate Dr. Garry Mayer, Assistant Professor at Boston University, will also have a lab on this floor to pursue his work on the systematics of *Epigonus,* a group of bass-like deep-sea fishes.

On the other side of the corridor, space is being reserved for a professor of biological oceanography. There is also an office for two scientific illustrators.

Senior photographer Alfonso H. Coleman comes to the MCZ after spending the last 25 years at Yale, 15 of them as a highly-skilled scientific photographer in the Yale Peabody Museum. He has recently opened a well-equipped photography studio, complete with four dark rooms, in the basement. Although Al is primarily a scientific photographer whose work is in great demand in the local biological community, he has also developed the ability to capture people and places on film. He recalls that perhaps his most spectacular achievement in reportorial photography occurred when he managed to get the entire Harvard and Yale Glee Clubs, as well as the bands of both universities, in one picture when they appeared on the stage of Wolsey Hall at Yale.



Al Coleman focussing in on a rhinoceros skull in his basement photo studio.

The building was designed by The Architects Collaborative, John C. Harkness, principal in charge, James E. Burlage, associate, and constructed by Porter Construction Company.

CURATOR OF MAMMALS LOOKS FOR EVIDENCE OF DOMESTICATION IN SOUTHEAST TURKEY

(Photo by Charles L. Redman)

On and off over the last ten years, on vacation or when otherwise unemployed, Miss Barbara Lawrence, Curator of Mammals, has devoted considerable time to the fascinating problem of unearthing (literally) early evidence for the domestication of animals. Beginning modestly enough with an interest in the ancestry of domestic dogs and the circumstances of their earliest association with man, the focus has shifted gradually to a study of the transition from a hunting and gathering way of life to the raising of domestic animals at Cayönü in southeastern Turkey. The site, being excavated by the University of Istanbul-University of Chicago Prehistoric Project, is in an area of considerable importance, in part because little archeological work had been done there, and in part because it lies between the eastern and western parts of the fertile crescent, where simple village farming communities are known from the end of the eighth and early in the seventh millenia.

Particular interest attaches to Cayönü itself because, after four seasons of excavation, the evidence seems good that in the rather short time span involved, a few hundred years between 7,500 and 6,500 B.C., there was a major shift in animal resources utilized. In the earliest levels the big, local, wild game animals were heavily preponderant, and the relative abundance of different bones suggests that butchering was taking place at some distance from the settlement. By the latest of the pre-fired-pottery levels, the inhabitants were relying for the most part on domestic sheep and goat. What was responsible for this change we don't yet know. Apparently it occurred rather swiftly and was accompanied by a sharp increase in the number of sheep relative to goat.

By itself, the discovery in this region of a site which spans the transition between wild and domestic is of great interest. What is even more fascinating is the existence of a well established, architecturally-complicated community which depended on wild, not domestic, animals. The abundant aurochs and deer are associated with grill plan foundations, some with enclosed pavements at their southern end. The actual foundation walls are closely spaced and vents through the surrounding wall suggest an arrangement for the circulation of air. One building had a plaster floor. Worked native copper and a compressed limestone terrazzo pavement are the earliest known examples of these technological achievements. Massive limestone slabs brought from across the river, and other materials from an even greater distance all combine to suggest a level of sophistication usually thought to depend on a control of the food supply which is implicit in domestication.

Much more remains to be found out; we still don't know whether domestication evolved locally or whether it was learned from contact with other peoples. Critical to this problem are the levels immediately preceding the domestic ones and it is hoped that further excavation will be possible.

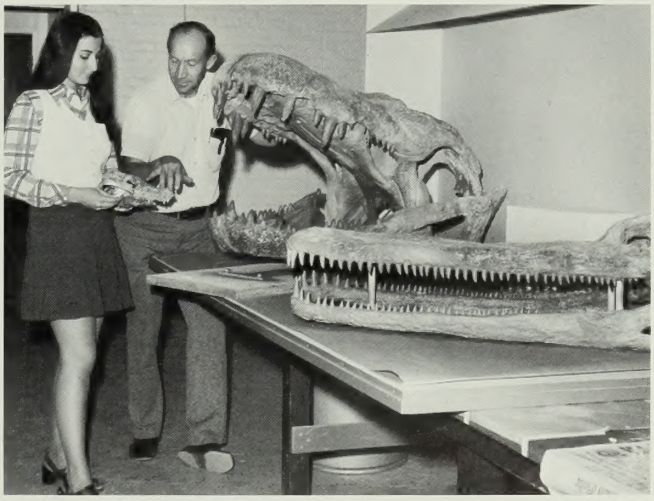
FIVE 6-MILLION YEAR-OLD EXTINCT CROCODILIANS FROM NORTHWESTERN VENEZUELA MAKE GOOD!

On their way to trying to pinpoint when in geological time the Isthmus of Panama emerged out of the ocean and joined North and South America, the MCZ's first paleontological expedition to tropical South America happened across some gigantic crocodilians while prospecting in the rocks of the Urumaco Formation. Professor Bryan Patterson's party, including Arnold D. Lewis, Daniel C. Fisher, Dr. Roger C. Wood, Robert Repenning, and Michael Stanford (the latter three from Stockton State College, N.J.), were digging for 5-7 million-year-old (Pliocene) vertebrate fossil remains in the state of Falcón in northwestern Venezuela to determine whether there was any evidence that mammals had migrated overland from the north when they turned up an unexpected bonus for the MCZ's Exhibition Department.

(Photo by Roger C. Wood)

Has this gigantic crocodilian skull really been waiting patiently all these years to be plucked by Arnie Lewis, Chief Preparator, and taken home to the MCZ? It certainly looks like it!

Preparation for display requires painstaking care. Robert Repenning and Kevin Maley worked on the five skulls for two months to ready them for the public. A sixth skull of 6 feet in length was unfortunately too large for the exhibit space available.



Before moving the nearly completed display to the Sea Serpent Room (where it can now be viewed) Exhibit Preparator Carol Campbell and Arnie Lewis discuss a fine point. The skull in the rear belongs to a not fully grown specimen called Dinosuchus *and is almost 4 feet in length. The entire animal would probably have attained a length of 30 feet at maturity. The odd creature in the front,* Maurosuchus, *has a wide flat snout, small elevated cranium, weakly constructed lower jaws, and a mouthful of small pointed teeth. How, and on what, it fed is puzzling; it is likely that it was a sort of animated fish-trap waiting for, or drifing into, schools of fish and then suddenly opening its mouth, depressing its throat, and engulfing the fish along with the water that came with them. The teeth would then have served to retain the fish while the water was being expelled.*

THE CONCORD FIELD STATION . . .

A former Nike missile bunker forms the foundation of this new building at the Concord Field Station in Bedford, Massachusetts. The construction was made possible by a generous grant from the Ford Foundation and was designed by Steven Blatt and Brink Thorn, two young architects from Yale.

With the new building completed, the underground bunkers renovated, and a daily shuttle bus ready to start transporting students back and forth from Cambridge in the Fall, the Concord Field Station is on the brink of a new era of activity. Director C. Richard Taylor hopes that the seminar room (which holds 70 people comfortably) and labs will be used for the teaching of appropriate portions of undergraduate courses. This year Professor William H. Bossert's ecology course has been meeting at the Field Station for the field section of the course.

The Concord Field Station also provides opportunities for community participation. An open house, general community colloquia, and the specialized bi-monthly seminar series are open to the community. One room of the new building will be devoted to a reference collection of the local flora and fauna and a field guide, prepared by David S. Woodruff, Instructor in Biology, is about to be published.

Dr. Taylor is pleased to announce a gratifying response to a recent letter to interested friends requesting support for the completion of the new facilities.

John Parke, hitherto unsung hero of the Concord Field Station, is putting the finishing touches on one of the lab floors. John has single-handedly painted and "floored" the entire 4,000 sq. ft. structure. Six faculty and student labs will provide the necessary counterpart to the controlled environment facilities underground.

(Photo by Norman C. Heglund)

Giving one of his characteristically brief (one-line) introductions at a recent Concord Field Station Seminar (held bi-weekly on Wednesday evenings in the seminar room of the new building) Director C. Richard Taylor elicits an hilarious response. Among the most obviously appreciative are graduate student John Fleagle (first on the left side of the table) who showed his film of Siamang gibbons in Malaysia on this particular occasion, Jan White, new Curatorial Associate in Entomology, to his right, and Gaby Dundon, the Director's secretary and new Editor of this Newsletter, to her right. Directly behind is Herbert Nipson, a graduate student with Professor Wilson. A few traces of the preceding dinner, a standard feature of these seminars and now greatly facilitated by the convenient adjoining kitchen, remain on the table.

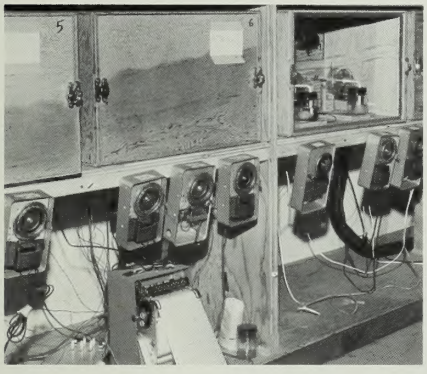
DEVELOPS ON MANY LEVELS

ABOVE . . .

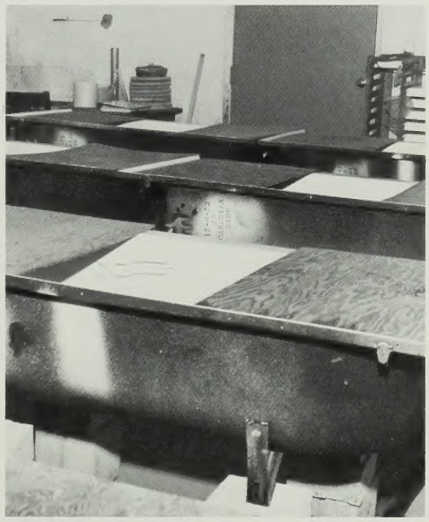
A barren isolated field of concrete in the middle of the woods of Bedford, with a building and two doors that lead to another world –

BELOW . . .

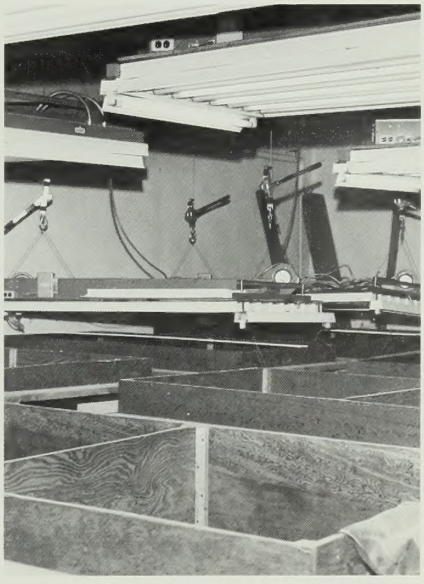
Mosquitos, silkmoths, and dandelions . . . here under the ground some of man's most annoying pests are cultivated for study.



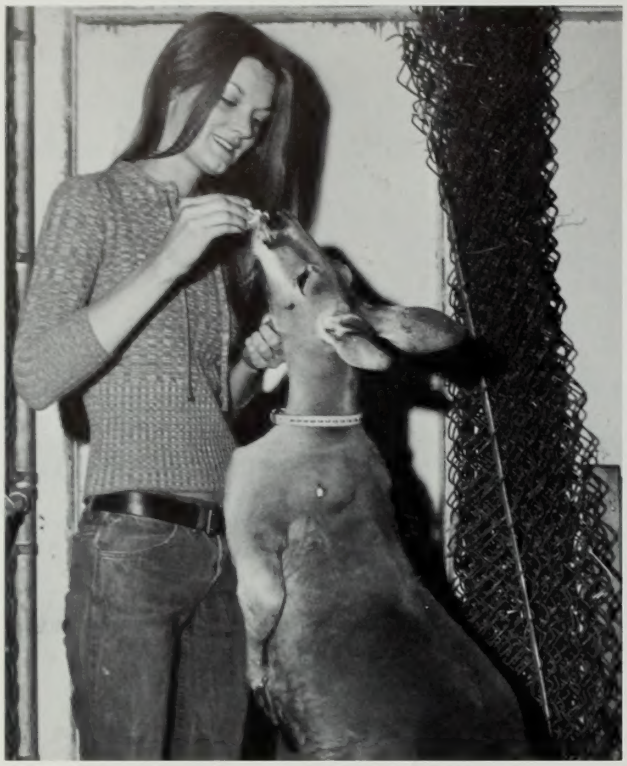
How does a silkmoth know when it is time to get up in the morning? Biological clocks are found in all plants and animals with the exception of bacteria and blue-green algae. In man, sensitivity to drugs, body temperature, alertness, and many other aspects of his physiology are clock-controlled. Biological clocks have certain common characteristics and Dr. James W. Truman, Harvard Junior Fellow, speculates that the elucidation of the principal of how a clock works in one animal would be applicable to many animals just as information about DNA and RNA gathered from bacteria has been found to apply to plants and animals. In this specially-designed facility, Dr. Truman is attempting to answer the questions: how is the clock of the silkmoth triggered by light? where is the clock located? what effects does the clock have on the general physiology of the animal? are there two types of clocks (one controlling development and another daily activity patterns)? how do the various photoreceptors affect the expression of clocks?



A complete swamp environment is simulated in this bunker. This is a room full of bathtubs which contain actively breeding mosquito populations in the damp tropical air. Not a choice spot for a picnic but ideal for the study of the biological control of mosquitos – an increasingly urgent problem since resistance to DDT and the ban of the use of chlorinated insecticides in many areas have made chemical control of these carriers of several of the world's most dreaded diseases more difficult. Dr. Lynn M. Riddiford, Associate Professor of Biology, and Dr. Andrew Spielman, Associate Professor of Tropical Public Health, are investigating the various ways in which the mosquito's own juvenile hormone can be introduced into the life cycle to control populations.



These boxes, arranged in a grid pattern, will allow Professor Otto T. Solbrig to study the effect of varying conditions on populations of dandelions and violets. In this controlled situation, individual environmental parameters can be manipulated (such as the type of soil and presence of nutrients, and the amount of water and light) and then correlated with studies of natural populations. Dr. Solbrig is using dandelions because they reproduce only asexually and violets because they reproduce both sexually and asexually to find out what role both types of reproduction play in genetic adaption to a changing environment.



Karen Tropeano of the Concord Field Station takes time out of her busy schedule to make the Australian visitors feel more at home. The kangaroos will eventually take up residence in a local zoo.

How do kangaroos cool off when they hop? Do they sweat or pant? To find out, Visiting Alexander Agassiz Professor Terence J. Dawson from the University of New South Wales, Australia, brought some kangaroos with him when he arrived here this winter to teach the major portion of Biology 20: Animal Physiology.

Humans cool off by sweating and all other small-to-medium-size mammal either sweat or pant but, by using Dr. C. Richard Taylor's treadmill and controlled temperature room at the Concord Field Station, Dr. Dawson found that kangaroos do both – they sweat when they exercise and pant when subjected to constant high temperature at rest. This dual system for losing heat makes them uniquely efficient animals since it is easier to move fast if you don't have to slow down to pant (kangaroos can maintain a hopping speed of 40 miles per hour for great distances) and it is more economical of the body's water to pant rather than sweat while at rest – an important consideration in a desert climate. Humans are efficient exercisers but we need a constant supply of water in the desert to replace the sweat loss.

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